STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

ADDENDUM No. 2

Project Name:	**Slate Canyon Water Pipeline Replacement**
DFCM Project No:	**00144420**
From:	**Bill Bowen**
To:	**Consultants**
Date:	**July 29, 2005**

The DFCM is providing the following documents in order to provide additional background information on the project and should be used for reference only.

Additionally, the documents have been modified to delete extraneous and irrelevant information.

1. **"Concept and Scoping Documents Submitted to the US Forest Service Prior to Conducting an Environmental Assessment"**; October 2003 as prepared by Nolte Engineers.

2. **"Feasibility Study of Slate Canyon Source Protection and Supply Line Replacement"**; September 2003 as prepared by Nolte Engineers.

This Addendum forms and becomes a part of the Contract Documents and modifies the original Bidding Documents. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

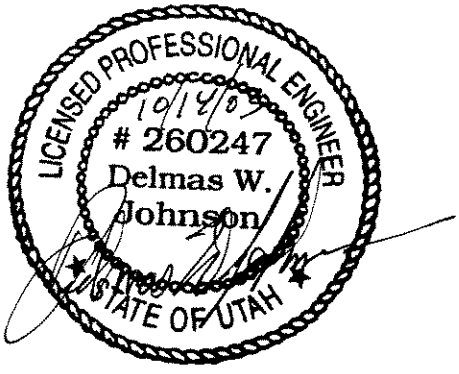
UTAH STATE DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT

CONCEPT AND SCOPING DOCUMENTS SUBMITTED TO U.S. FOREST SERVICE PRIOR TO CONDUCTING AN ENVIRONMENTAL ASSESSMENT

PROPOSED SLATE CANYON SOURCE DEVELOPMENT AND TRANSMISSION PIPELINE REPLACEMENT

FOR DFCM PROJECT NO. 00144420

UTAH STATE HOSPITAL



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October 2003

PROPOSED CONCEPT

Introduction

This document and attached maps and drawings, are presented to the Forest Service to present the concept and scope of the proposed improvements to the Utah State Hospital Water System. This information is being provided by the Utah State Division of Facilities Construction and Management in behalf of the Utah State Hospital, to initiate the formal review process by the Forest Service. A brief description follows.

The principal sources of culinary water for the Utah State Hospital are a group of spring sources located up Slate Canyon. The spring collection appurtenances have been updated with compliant access hatches and flow-to-waste pipelines with screen covers within the last 10 years. However, the transmission pipeline is approximately 70 years old, and is currently in poor condition. There is approximately a ½ mile of the pipeline which is exposed and/or suspended on the walls of the canyon. The existing 5-1/2-inch diameter cast iron pipe is perilously thin-walled due to corrosion over the years of service. There are some existing air vent appurtenances on the existing pipeline, but no pressure control systems exist at this time on the supply line. In recent years, maintenance of the pipeline has become significant, as deterioration continues.

Of the seven (7) original spring sites, Knight Spring #1, Knight Spring #2 and Knight Spring #3 collection facilities and pipeline were rendered unusable over a period of several years (1977 – 1988) when a slope failure(s) and debris flow(s) went through the area, induced by higher than normal precipitation. While no flow records exist from these springs, the contribution of Knight Springs to the total supply volume available for the State Hospital was significant historically.

Slate Canyon Transmission Pipeline Replacement

The recommended approach to address the aging transmission pipeline, is to replace the entire supply pipeline from each spring junction box, to the storage reservoir on the bench above the State Hospital. Placement of the new pipeline in the existing road alignment would create much easier access to pipeline alignment in the future and would minimize the impacts to the Slate Canyon watershed. Suitably designed air vents would be installed at the optimum points along the pipeline alignment. Typical construction details (see Sheet 1) are included with this submittal, showing a rock excavation trench and a granular excavation trench. The majority of the pipeline construction will involve rock excavation, which would be placed adjacent to the existing road as shown, as this material is unsuitable for pipeline backfill. However, the granular material trench specifies native backfill above the pipe zone, therefore there would be less "waste" fill material where granular excavation occurs. Any surface placement of "waste" material will be done in a manner acceptable to the Forest Service.

Where the proposed replacement pipeline crosses the drainage channel, appropriate erosion control appurtenances will be designed (see Sheet 2) and installed for the design hydrologic event

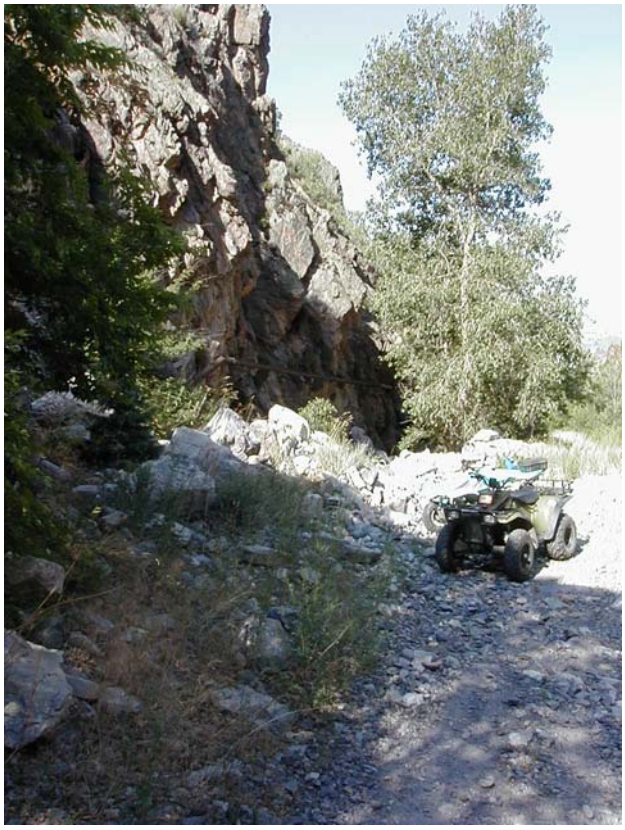
(preferably the 100-year, 6-hour storm). From our survey information at this time, there will be approximately 13 crossings of either the primary drainage channel in Slate Canyon, or tributary, auxiliary channels.

Currently, Provo City's water rights in Slate Canyon are minimal (less than 46 gpm) as outlined earlier in this report. The Forest Service has continued to emphasize their desires that the final solution of pipeline replacement meet the objectives of both the DFCM/State Hospital and Provo City. If Provo City desires to recapture their groundwater supply from the two springs in the lower canyon as a drinking water source, we will pursue coordination with Provo City to enable a final solution for Slate Canyon with one-time construction impact, if they wish to participate.

Replacement of the supply pipeline in Slate Canyon is a project of significance in size and scope, due to the nature of the conditions in Slate Canyon and the existing regulatory climate. It was over 70 years ago when this project was constructed, and the water resource and engineering worlds have changed significantly, along with a marked increase of environmental awareness and sensitivity. However, this supply pipeline is critical to the culinary supply of water needed by the State Hospital. Eventually, the entire reach of pipeline will have to be replaced prior to complete failure.

Division of Facilities Construction and Management
A Service of the Department of Administrative Services

FEASIBILITY STUDY OF SLATE CANYON SOURCE PROTECTION AND SUPPLY PIPELINE REPLACEMENT



NOLTE
BEYOND ENGINEERING

September 2003

UTAH STATE DIVISION OF FACILITIES AND CONSTRUCTION MANAGEMENT

FEASIBILITY STUDY OF SLATE CANYON SOURCE DEVELOPMENT, SOURCE PROTECTION AND SUPPLY PIPELINE REPLACEMENT

FOR DFCM PROJECT NO. 00144420

UTAH STATE HOSPITAL

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EXECUTIVE SUMMARY

This report is presented to summarize the source protection issues of the existing Boardman Springs and replacement of the supply pipeline in Slate Canyon.

The current collection facilities at the respective spring sites are generally in compliance with State source protection requirements.

The Slate Canyon supply pipeline is in need of substantial upgrade and replacement. While the most costly alternative is to replace the entire pipeline, in the long term the costs will be lower and the supply pipeline will be more reliable in the interim. Additionally, the USDA Forest Service has reissued the Slate Canyon special use permit with the explicit understanding that the State of Utah will address the issues as soon as possible.

CHAPTER I
INTRODUCTION

The principal sources of culinary water for the Utah State Hospital are a group of spring sources located up Slate Canyon. The spring collection appurtenances have been updated with compliant access hatches and flow-to-waste pipelines with screen covers within the last 10 years. However, the supply pipeline is approximately 70 years old, and is currently in poor condition. There is approximately a ½ mile of the pipeline which is exposed and/or suspended on the walls of the canyon. The existing 5-1/2-inch diameter cast iron pipe is perilously thin-walled due to corrosion over the years of service. There are some existing air vent appurtenances on the existing pipeline, but no pressure control systems exist at this time on the supply line. In recent years, maintenance of the pipeline has become significant, as deterioration continues.

Of the seven (7) original spring sites, Knight Spring #1, Knight Spring #2 and Knight Spring #3 collection facilities and pipeline were destroyed over a period of several years (1977 – 1988) when a slope failure(s) and debris flow(s) went through the area, induced by higher than normal precipitation. No flow records exist from these springs.

CHAPTER II
SOURCE DEVELOPMENT

Water Rights

The Knight Spring water rights are 55-4108 (1.10 cubic feet per second) and 55-78 (0.11 cubic feet per second). Knight Springs and Boardman Springs are included on the same right (55-4108) with two points of diversion. If additional water is captured, water rights would need to be transferred to the appropriate point of diversion. 55-4108 is a valuable diligence right with an 1867 priority. 55-78 is a certified right with a 1923 priority.

After a thorough water right search, diversion points from those rights owned by the State of Utah – Utah State Hospital do not correlate to all of the known spring collection areas, i.e., Boardman 1, 2, 2a and 3 and Knights Springs 1, 2 and 3. The diversion locations on water right 55-4108 correspond to Boardman 1 and Knight 3 (which is not currently developed). 55-78's only diversion point is also at Knight 3. We recommend filing appropriate Change Applications with the State Engineer to match the known diversion points, and estimating spring yield from each collection area through acceptable hydraulic methods; checking all of the flows against the combined flow data from the newly installed meter.
(These requirements will be included in the selected consultant's scope of work.

Provo City only has two small certified and approved water rights in the lower portion of Slate Canyon. Hathenbruck Springs (55-92) is certified at 0.10 cfs or 45 gpm, and an unnamed spring (55-93) at 0.0012 cfs or 0.54 gpm. Any further claims to additional water at Boardman or Knight Springs are unsubstantiated by existing water rights.

The U.S. Forest Service also have diligence rights at Boardman #2 (55-7424 – 0.015 cfs), and at Knight Spring #2 (also referred to as Buckley Springs - 55-7423 – 0.015 cfs). These rights are used as a wildlife drinking water supply.

Hydrogeology

The geologic formations in the vicinity of the former sites of Knight Springs and Boardman Springs consist of Great Blue Limestone (Mgb), Manning Canyon Shale (PMmc), Bridal Veil Limestone member of the Oquirrh Formation (Pob), the Lower Sandy member of the Oquirrh Formation (Pol), and Moraine and Glacial Outwash Deposits (Qm).

The Great Blue Limestone Formation (Mgb) is described by Baker (1973) as a carboniferous rock of Upper Mississippian age, consisting of nearly homogeneous dark-gray to black limestone in very thin, regular beds. The limestone contains some thin beds and nodules of black chert which are most abundant in the upper part of the formation. Thin beds of black shale and/or rusty-weathering fine-grained quartzite are bedded with the limestone. The thin-bedded limestone weathers into rather characteristic pale-gray flakes and slabs that commonly have a pinkish tint.

The Great Blue Limestone is overlain by the Manning Canyon Shale Formation, and is also of carboniferous origin and Upper Mississippian age. Baker (1973) describes the Manning Canyon Shale Formation as being "...composed principally of brown to black shale but contains some beds of gray to black, generally shaly limestone, numerous thin beds of light-gray, fine-grained, light-brown-weathering quartzite, and a few lenses of orange-brown-weathering sugary sandstone and grit."

The uppermost formation at the upper end of Slate Canyon is the Oquirrh Formation, which directly overlies the Manning Canyon Shale Formation due to thrust faulting. Faulting will be discussed in more detail in the following section. The Oquirrh Formation is of Pennsylvanian and Permian age, and is described by Baker (1973) as a limestone base with overlying layers of quartzitic sandstone and limestone. The base limestone unit is known as the Bridal Veil Limestone Member, which is described by Baker (1973) as consisting "...of medium- to dark-gray, thin- to thick-bedded limestone with nodules and thin nodular beds of black chert in the upper part and with some interbedded dark-gray to black shale and a few beds of quartzite." The overlying sandstone member of the Oquirrh Formation is described as "fine- to coarse-grained thin- to thick-bedded tan to gray sandstone with interbedded gray to black cherty limestone."

The area immediately surrounding the Knight Spring #3 site and continuing eastward in a tongue-like configuration are moraine and glacial outwash deposits of varying thickness, which overly the Manning Canyon Shale and the Oquirrh Formation.

Significant structural features at the upper end of Slate Canyon are the Horse Mountain and West Aspen Grove Faults. These are significant normal faults which are typically conduits of groundwater flow in the previously described formations. The site of the original Knight Spring #3 is located just below where the West Aspen Grove Fault crosses Slate Canyon, striking north-south. The West Aspen Grove Fault is also the where the Manning Canyon Shale interfaces with the Bridal Veil Falls Member of the Oquirrh Formation. The Manning Canyon Shale acts as an aquitard through this segment of the Wasatch Range. The groundwater fracture system of the Oquirrh Formation flows in a westward direction due to the dip of the formations and the influence of surface topography. The groundwater is therefore intercepted by the West Aspen Grove Fault. Unable to flow further west due to the shale, the flow moves predominantly along the fault.

The former Knight Spring #3 location is adjacent and down-gradient to a topographic low point of the surface expression of the fault. Hydrogeologically, the Knight Spring location is a prime spring development area, within the moraine and glacial deposits which are recharged by the West Aspen Grove Fault. The conditions indicate that significant yields could be intercepted through a properly constructed collection system.

The former collection areas for Knight Springs #1 and #2 are located closer to the Boardman Spring area than Knight Spring #3. While Knight Spring #3 is nearly 3,000 feet further up the south fork of Slate Canyon, the hydrogeologic data and photos taken by the U.S. Forest Service when the line connecting the spring was severed, indicate that Knight Spring #3 had a more significant yield than Knight #1 and #2. The area in around Knight Springs #1 and #2 is currently heavily overgrown with vegetation of various types, and therefore it was not possible to locate any evidence of the former collection works. Access to Knight Springs #3 is not possible at this time.

Impact Issues

The U.S. Forest Service has indicated that an Environmental Assessment (EA) is required for the Slate Canyon supply pipeline replacement

CHAPTER III

SOURCE PROTECTION

CURRENT DRINKING WATER SOURCE PROTECTION (DWSP) PLANS

The current DWSP Plan for Boardman and Knight Springs includes drawings of the collection areas of the existing springs from the redevelopment that occurred in 1992. The construction of the collection areas are in compliance with State Code R309-204 (Source Development for Springs). All of the pertinent elements of protection, including liner and impervious soil have been included in the redevelopment of the Springs. Therefore, no additional design/construction work to meet source protection requirements is necessary at this time. Copies of spring construction drawings are included in the Appendix.

Due to the remoteness of the spring collection areas, fences are not necessarily required, as outlined in R309-204. The fence requirement may be waived by an exception from the Executive Secretary of the State Division of Drinking Water. There are no livestock in the area, therefore the risk of contamination from the surface is rather low. Additionally, public access is restricted to Slate Canyon by a locked gate. Considering the relatively significant distances involved between the Springs and the mouth of Slate Canyon, it is a reasonable assumption that no fences will be required. Our recommendation is to request an exception to the fence requirement. The exception will not only avoid the cost to install the fence initially, but will also prevent the necessary maintenance which surely accompanies a fence at high elevations subjected to significant snow loads on a seasonal basis.

CONCLUSIONS AND RECOMMENDATIONS

From a source protection standpoint, the collections areas of Boardman Springs 1 – 3 are in general compliance with R309-204, and require no modifications, except as follows. From observations made at each individual spring collection area, it is recommended that the following changes/modifications be made:

1. Replace aluminum hatches that have holes and/or missing handles, with an aluminum compliant hatch which has more durable handles. The Junction Box, Boardman Spring #2 and Boardman Spring #2a were observed to have holes in the hatch where the handles have been removed or the hatch simply has damaged handles.

2. Raise collection box elevation of Boardman Spring #2a to a suitable height. Currently the collection box is located in the surface drainage channel, and may be susceptible to contamination from surface runoff. A suitable elevation would be 12-inches above the top of the embankment of the existing drainage channel.

CHAPTER IV
SLATE CANYON SUPPLY PIPELINE REPLACEMENT

REPLACEMENT OF ENTIRE REACH OF SUPPLY PIPELINE

The alternative approach is to replace the entire supply pipeline from each spring junction box, to the storage reservoir on the bench above the State Hospital. Placement of the new pipeline in the existing road would create much easier access to pipeline alignment in the future, and would also be protected from watershed erosion through a properly constructed erosion control appurtenances. With the full replacement option, air vents and a pressure relief valve would be installed at the optimum points along the pipeline alignment.

Where the new pipeline crosses the drainage channel, appropriate erosion control appurtenances would be designed and installed for the design hydrologic event (preferably the 100-year, 6-hour storm). From our survey information at this time, there will be approximately 13 crossings of either the primary drainage channel or tributary, auxiliary channels.

ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The U.S. Forest Service has indicated that an Environmental Assessment will be required to address the impacts of replacement of the supply pipeline to the existing environment in Slate Canyon. Through contact with various individuals with the Forest Service and other agencies, we have determined that the scope of the required Environmental Assessment will be as follows:

1. Develop proposal for scope of work within Slate Canyon;
2. Internal agency scoping by the Forest Service;
3. Environmental Assessment;
    a. Scoping and Analysis performed by others;
4. If impacts are deemed to be significant, it will move to the Environmental Impact Statement (EIS) status; otherwise a decision will be proffered;
5. Public Review (30 days);
6. FONSI (Finding of No Significant Impact);
7. Implement.

CONCLUSIONS AND RECOMMENDATIONS

Replacement of the supply pipeline in Slate Canyon is a project of significance in size and scope, due to the nature of the conditions in Slate Canyon and the existing regulatory climate. It was over 70 years ago when this project was constructed, and the water resource and engineering worlds have changed significantly, along with a marked increase of environmental awareness and sensitivity. However, this supply pipeline is critical to the culinary supply of water needed by the State Hospital. Eventually, the entire reach of pipeline will have to be replaced prior to complete failure. The question this report has attempted to address is whether the time is now. The principle factor affecting this decision is one of economics, given the Forest Service's preference that this issue is dealt with completely and entirely in one

effort. If the resources can be acquired to do so, replacement of the entire supply pipeline is the best long term solution, and will ultimately have to occur. We can assume that costs will continue to increase, and that full pipeline replacement in several years will be more costly from an economic standpoint, and also may be more difficult from an environmental perspective, depending upon whether the regulatory climate becomes more restrictive.

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